

**REMARKS**

This reply is in response to the Office Action dated December 20, 2010, in which the Examiner indicates that claims 1-10 are pending and claims 12-36 are withdrawn. Upon entry of the following arguments and amendments, Applicants submit that claims 1-10, 12-17, and 33-36 will be pending. Claim 11 is canceled. Claims 12-36 are currently withdrawn. Claims 1 and 12 are amended to incorporate the feature that the axial flow apparatus provides the axial flow gas into the reaction chamber from the bottom. Support for these amendments can be found in para. [0039] of the published specification. Claim 10 is amended to clarify that the increasing gap provides a geometry for producing a gliding arc and not the gliding arc itself. No new matter is added by these amendments.

Applicants wish to thank Examiner Mayekar for the courtesy he extended their representative during their telephone interview on March 23, 2011, during which they discussed the proposed amendments to claims 1 and 12, and during which Examiner Mayekar indicated that these amendments overcame the anticipation and obviousness rejections currently based on the references cited herein.

**Alleged Anticipation or Obviousness Over the Orbach Reference**

Claims 1-8 stand rejected under 35 U.S.C. § 102(b) as allegedly anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as allegedly obvious over U.S. Patent No. 3,042,830 (“the Orbach reference”). Applicants traverse this rejection because the Orbach reference does not contain all of the features of the pending claims, so the Examiner has failed to meet the Office’s burden for establishing a *prima facie* case.

To show anticipation, the Office must prove, clearly and unequivocally, that each limitation of the pending claims is described in a single prior art reference. *Atofina v. Great Lakes Chem. Corp.*, 441 F.3d 991, 999 (Fed. Cir. 2006). Similarly, when determining whether a claim is obvious, an examiner must make “a searching comparison of the claimed invention – *including all its limitations* – with the teaching of the prior art.” *In re Ochiai*, 71 F.3d 1565, 1572 (Fed. Cir. 1995) (emphasis added). Thus, “obviousness requires a suggestion of *all*

*limitations* in a claim.” *CFMT, Inc. v. Yieldup Intern. Corp.*, 349 F.3d 1333, 1342 (Fed. Cir. 2003) (citing *In re Royka*, 490 F.2d 981, 985 (CCPA 1974)).

The present claim 1 is drawn to a vortex reactor having a frustum-shaped portion and an axial flow apparatus configured to provide an axial gas flow *directed away from the narrow portion of the reactor* (i.e., claim 1 reads “said frustum-shaped portion having *a narrower part that is downwardly oriented* . . . [and] an axial flow apparatus fluidly connected to the reaction chamber . . . whereby the axial flow apparatus is configured so as to provide an *axial gas flow into the bottom of the reaction chamber directed upward*”).

The Examiner states that Figs. 1-4 of the Orbach reference teaches “an axial flow apparatus 15 (where the flow shows straight thru an arc gap 23) . . .” However, arc gap 23 is at the narrow portion of frustum-shaped portion of the Orbach reactor. At best, the axial flow apparatus in the Orbach reactor can be described as being directed into the reactor orthogonal to the wall of the reactor, or as described by the Examiner, in the direction toward the narrow portion of the reactor. In neither case, however, does the Orbach reference teach or suggest that the axial flow apparatus is configured to provide an axial gas flow *directed away from the narrow portion of the reactor*.

Since a finding of either anticipation or obviousness requires that the reference(s) describe all of the elements of the claims, and since the Orbach reference does not teach or suggest all of the elements of claim 1, it cannot anticipate or render obvious the present claims. On at least this basis, the Examiner has failed to establish a *prima facie* case of either anticipation or obviousness. During the telephone interview of March 29, Examiner Mayekar agreed that this reference did not anticipate or render obvious these claims. Applicants request withdrawal of this rejection.

#### **Alleged Obviousness Over the Orbach Reference**

Claims 9 and 10 stand rejected under 35 U.S.C. § 103(a) as allegedly obvious over the Orbach reference. Applicants traverse this rejection. Claims 9 and 10 depend from claim 1 and the Examiner has failed to establish a *prima facia* case of anticipation or obviousness for claim 1. Nothing in the rejection of claims 9 and 10 remedies the deficiency in the rejection of claim 1.

Because claim 1 is not obvious, claims 9 and 10 are also not obvious. Ortho-McNeil Pharm, Inc. v. Mylan Labs, Inc. 520 F.3d 1358, 1365 (Fed. Cir. 2008) (a dependent claim depending from a non-obvious independent claim is itself non-obvious). During the telephone interview of March 29, Examiner Mayekar agreed with this conclusion. Applicants request withdrawal of this rejection.

#### **Alleged Anticipation by the Tuszko Reference**

Claims 1-3 stand rejected under 35 U.S.C. § 102(b) as allegedly anticipated by U.S. Patent No. 4,927,298 (“the Tuszko reference”). Applicants traverse this rejection because the Tuszko does not describe the features of claims 1-3.

As described above, in relevant part, claim 1 describes a reaction chamber comprising . . . a substantially frustum-shaped portion forming a reaction chamber therein, said frustum-shaped portion having a narrower part that is downwardly oriented; [and] an axial flow apparatus fluidly connected to the reaction chamber for creating an axial gas flow in said reaction chamber, whereby the axial flow apparatus is configured so as *to provide an axial gas flow into the bottom of the reaction chamber directed upward.*” That is, the air is introduced into the bottom of the reaction chamber, such that the axially directed air is able to push the contents of the reactor upwards.

The flow apparatus of the Tuszko apparatus is different both in configuration and function. As described by the Examiner (Office Action dated 12/20/10, page 4), the Tuszko reference teaches an apparatus having a frustum-shaped portion and a flow apparatus, wherein the flow apparatus provides for air to be “introduced from the bottom of the flow apparatus *to its top* (the flow of air read on axial flow directed upwards).” While the tube in Tuszko enters the *reaction chamber* from the bottom, the axially directed air does not. The configuration of the Tuszko flow apparatus provides that “its upper end [be] located in the region of the exhaust pipe bottom” (col. 3, lines 4-5; FIG. 1) and its purpose is to provide “a steady supply of air core in *to [the] exhaust pipe*” (e.g., claim 1), located at the top of the reactor and not directly to the bottom of the reaction chamber.

Since the Tuszko reference does not teach or suggest all of the elements of the claims, Applicants believe it does not anticipate claims 1-3 and request reconsideration and withdrawal of this rejection. During the telephone interview of March 29, Examiner Mayekar agreed that, in light of the proposed amendment, this reference did not anticipate or render obvious these claims.

#### **Alleged Anticipation by the Torregrossa Reference**

Claims 1-3 stand rejected under 35 U.S.C. § 102(b) as allegedly anticipated by U.S. Patent No. 5,116,488 (“the Torregrossa reference”). Applicants traverse this rejection because the Torregrossa reference fails to describe all of the elements of claims 1-3.

The features of the present invention have been described above. The Torregrossa reference describes a very different reactor configuration, and particularly provides no apparatus for directing an axial flow of gas upward into bottom portion of the reactor. The Examiner points to Fig. 1 and col. 1, lines 9-28 as allegedly teaching that the gas inlet 17 provides this element. At best, gas inlet 17 directs a gas flow circumferentially, and *does not direct an axial flow*. That is, a careful reading of both col. 1, lines 9-28 and especially col. 4, lines 10-13 and claim 1 describes that conduit 17 provides for the flow of fluid, particularly gas, into plenum 22 which distributes the gas flows *tangentially* through the porous *side-wall* surface of revolution 18, which (according to Fig. 1) reaches from the bottom *to the top* of the *cylindrical reactor*. The gas port 17 cannot be described as “an axial flow apparatus [] configured so as to provide an axial gas flow into the bottom of the reaction chamber directed upward,” as claimed in claim 1 of the present invention.

Since the Torregrossa reference does not teach or suggest all of the elements of the claims, Applicants submit that it does not anticipate claims 1-3 and request reconsideration and withdrawal of this rejection. During the telephone interview of March 29, Examiner Mayekar agreed that, in light of the proposed amendment, this reference did not anticipate or render obvious these claims.

**Alleged Obviousness Over the Torregrossa Reference in View of the Tuszko Reference**

Claims 2-5 stand rejected under 35 U.S.C. § 103(a) as allegedly obvious over the Torregrossa reference in view of the Tuszko reference. Claims 2-5 depend from claim 1, which has not been shown to be either anticipated or obvious by any of the references cited. Applicants traverse this rejection because neither the Torregrossa nor the Tuszko reference, either individually or together, teach or suggest the elements of claim 1, previously described, nor has the Examiner sought to use these combined reference to reject claim 1. Because nothing in the rejection of claims 2-5 remedy the deficiency in the rejection of claim 1, and because claim 1 is not obvious, claims 2-5 are also not obvious. Ortho-McNeil Pharm, Inc. v. Mylan Labs, Inc. 520 F.3d 1358, 1365 (Fed. Cir. 2008) (a dependent claim depending from a non-obvious independent claim is itself non-obvious). During the telephone interview of March 29, Examiner Mayekar agreed with this conclusion. Applicants request reconsideration and withdrawal of this rejection.

**Restriction Requirement: Alleged Lack of Single Inventive Concept.**

In the present office action, the Examiner finalized a previous restriction requirement, by stating that claims 12-17 and 33-36 do not present a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding technical features. The basis for this finality of restriction was said to be because claim 1 is allegedly anticipated by the Orbach, Tuszko, or Torregrossa references. However, as shown in this response, this basis for maintaining the restriction is flawed. None of these cited references anticipates claim 1. Similarly, independent claim 12 recites a method of using a vortex reactor containing the same technical features as described in claim 1. Claims 34 and 35 depend directly from claim 9, which ultimately depends from claim 1, thereby also containing the same technical features as claim 1.

Since the restriction was made final based on an errant finding of anticipation, Applicants request rejoinder of claims 12-17 and 33-36.

**Alleged Deficiency of Oath**

The oath dated 28 February 2007 is allegedly defective because non-initialed and/or non-dated alterations were made, with respect to address of inventor, Young Cho. The Examiner has indicated that a new oath in compliance with 37 CFR 1.67(a) is required. M.P.E.P. §602.1 indicates that, in some cases (specifically citing M.P.E.P. §601.05, "Non-initialed and/or non-dated alterations have been made to the oath or declaration") such a deficiency can be corrected by a supplemental paper, such as an application data sheet. Accordingly, and coincident with this response, Applicants are filing a Supplemental Application Data Sheet to correct this defect.

**Conclusion**

Applicants believe that the foregoing constitutes a complete and full response to the Office Action of record. Applicants respectfully submit that all pending claims are in condition for allowance and entry of the present amendments and notification to that effect is earnestly requested. Moreover, in view of the fact that the restriction of claims 12-17

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